CITY OF CORVALLIS

STORMWATER MASTER PLAN

September 2002

CORVALLIS
ENHANCING COMMUNITY LIVABILITY

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[1] *The Stormwater Planning Committee (SWPC) was able to review and edit only Chapters 1 through 5 of the Stormwater Master Plan. The SWPC did not review the basin chapters or associated projects.*

ABBREVIATIONS

BMP	Best Management Practice
B&W	Barney and Worth
cfs	Cubic feet per second
COE	U.S. Army Corps of Engineers
CWA	Clean Water Act of 1977
DEQ	Oregon Department of Environmental Quality
DSL	Oregon Division of State Lands
EIA	Effective Impervious Area
ENR	Engineering News Record
EPA	U.S. Environmental Protection Agency
EQC	Oregon Environmental Quality Commission
ESA	Endangered Species Act of 1973
ESU	Evolutionarily Significant Unit
F	Fahrenheit
FEMA	Federal Emergency Management Agency
FIA	Federal Insurance Administration
FIRM	Flood Insurance Rate Map
FR	Federal Register
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
LCOG	Lane County Council of Governments
LID	Local Improvement District
MDOE	Maryland Department of the Environment
mg/L	Milligrams per liter
MIA	Mapped Impervious Area
mL	Milliliter
MRCI	Municipal, residential, commercial, and industrial
MS4	Municipal Separate Storm Sewer System
NAQWA	National Water Quality Assessment Program
NCSCC	North Carolina Sedimentation Control Commission
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OAR	Oregon Administrative Rule
PFC	Properly Functioning Conditions
ODOT	Oregon Department of Transportation
PUD	Planned Unit Development
RUNOFF	Hydrologic model
SCS	U.S. Soil Conservation Service
SDC	System Development Charge
SDWA	Safe Drinking Water Act
SWMP	Stormwater Master Plan
SWPC	Stormwater Planning Committee
TM	Technical Memorandum
TMDL	Total Maximum Daily Load
UGB	Urban Growth Boundary
UIC	Underground Injection Control
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WPCF	Water Pollution Control Facility
WRD	Oregon Water Resources Department
WWTP	Wastewater Treatment Plant
XP-SWMM	EPA Stormwater Management Model, Hydrologic/hydraulic modeling package

GLOSSARY OF TERMS

Alluvial Stream – A stream that deposited the bed and bank materials of the channel perimeter under the present hydrologic regime. Alluvial streams have erodible boundaries and are free to adjust dimensions, shape, pattern, and gradient in response to change in slope, sediment supply or discharge.

Base Flood – Flood that has a 1 percent chance of occurring in any given year. This 100-year flood has been adopted by the Federal Emergency Management Agency (FEMA) for floodplain management purposes, and refers to a flood event that inundates the entire 100-year floodplain. (See "Floodplain, 100-Year" and "Flood, 100-Year.")

Beneficial Uses – The beneficial uses assigned by basin in the Oregon Administrative Rules for water quality and for Corvallis streams are as follows: public and private domestic water supplies, industrial water supplies, irrigation, livestock watering, anadromous fish passage, salmonids fish rearing and spawning, resident fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality, and hydropower, unless changed through a use attainability analysis.

Best Management Practices – Strategies for improving runoff water quality that are accepted throughout the industry. They include structural and non-structural measures to control pollutants at the source before they enter a stream. Structural BMPs include:

- Retention basins
- Detention basins
- Constructed wetlands
- Infiltration practices
- Filters
- Bioretention
- Biofilters (swales and filter strips)

Non-structural BMPs include:

- Street sweeping
- Illicit connection identification and elimination
- Public education and outreach
- Land use modifications to minimize the amount of impervious surface area
- Waste collection
- Proper materials storage

Bioswale – A constructed shallow, wide vegetated ditch through which storm runoff travels and that uses natural methods of cleaning water, such as sediment trapping and microorganism activity to remove pollutants.

City Limits – Boundary line that identifies land within the City.

Compatible – The ability of different uses to exist in harmony with each other. "Making uses compatible with each other" implies site development standards that regulate the impact of one use on another.

Corvallis Streams – All streams located either in part or entirely within the City's Urban Growth Boundary.

Density Transfer – Permits residential density under a single development application to be shifted from one part of a site and added to another part of the same site. It can be used to protect a wetland or other significant natural resource that is on the site without losing overall density in the development. Density transfer does not permit a net increase in density for the entire site, however it can specify that more intense residential building types are permitted within the area of the site that is to receive the density transfer.

Detention Basin – A constructed pond designed to temporarily collect runoff from a development to maintain the runoff rate to a specified pre-development flow.

Development – Making a material change in the use or appearance of a structure or land, dividing land into two or more parcels, changing the land use designation, or creating or terminating a right of access. Where appropriate to the context, development refers to the act of developing or the result of development.

Drainageway – Natural or artificial watercourse, including adjacent riparian vegetation, that transmits natural stream or stormwater runoff from a higher elevation to a lower elevation.

Drainageway Dedication – The transfer of ownership, in fee-simple, of a given piece of property for the purpose of stormwater functions.

Endangered Species – Any species in danger of extinction throughout all or a significant portion of its range.

Endangered Species Act – Federal regulatory program to protect fish, wildlife, and plants from extinction. It provides a means whereby the ecosystems upon which threatened and endangered species depend, may be conserved to ensure the continued survival of the species.

Enhance – Augment into a more desirable condition.

Erosion – Movement or displacement of soil resulting from natural and human-induced processes including weathering, dissolution, abrasion, corrosion, and transportation.

Flood, 100-year – A flood with a one percent chance of occurring in any given year. This is the flood most commonly used for regulatory purposes and is called the base flood. This flood event inundates the entire 100-year floodplain. (See "Base Flood.")

Floodplain – Area adjacent to a stream or a river channel that is covered by water when the river or stream overflows its banks.

Floodplain, 100-year – Area adjacent to a stream or river channel that includes land with a range of flooding frequency, from areas that flood frequently to the highest ground that has a one percent chance of flooding in any given year. The 100-year floodplain is the area subject to base flood regulations, and consists of the floodway and floodway fringe. (See "Base Flood" and "Flood, 100-Year.")

Floodplain Functions – Hydrological and ecological functions including temporary storage of floodwater, deposition of sediments outside of the channel, groundwater recharge, filtering of pollutants, and reduction of floodwater velocity and erosive forces. Also included, but to a lesser extent in previously urbanized areas, are such functions as nutrient exchange, refuges, and feeding areas for fish.

Floodway – River channel or other watercourse and the adjacent land areas that accommodate the base flood event without cumulatively increasing the water surface elevation more than 0.2 feet.

Floodway Fringe – Area of the 100-year floodplain lying outside of the floodway.

Flow-through Design – Typically a structure that does not hinder or obstruct the movement of, or displace, surface floodwater.

Hyetograph – A graph of rainfall intensity versus time.

Impact – The consequences of a course of action; the effect of a goal, guideline, plan, or decision.

Infill – Developing vacant and partially vacant land within a built environment. To be considered infill, such land shall be less than 0.5 acres in size for residentially designated lands or less than 1.0 acre in size for lands designated otherwise.

Intermittent Streams – An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Key Areas of Exchange – Locations within a watershed where groundwater recharge from surface water occurs (e. g., permeable depressions) or where streams are fed by groundwater (e.g., springs).

Large Wood – The National Marine Fisheries Service defines large wood as 60 centimeters (24 inches) in diameter and at least 15 meters (49 feet) long. In the analysis of Corvallis' local streams done for the Endangered Species Act Salmon Listing Response Plan, large wood was identified as 10 centimeters (4 inches) in diameter and 3 meters (10 feet) long.

Maintain – Support, keep, and continue in an existing state or condition without decline.

Natural Swale – Naturally occurring linear depression that carries surface water only after rainfall. It also transports subsurface water seasonally or throughout the year.

NPDES – National Pollution Discharge Elimination System, which is the permitting system established by the Environmental Protection Agency to administer the Federal Clean Water Act.

Perennial Stream – A stream that has flowing water year-round during a typical year. The water table is located above the streambed for most of the year. Groundwater is the primary source of water for stream flow; runoff from rainfall is a supplemental source of water for stream flow.

Permeability – Ability of the soil to absorb water.

Policy – Decision-making guideline for actions to be taken in achieving goals and the community's vision.

Pre-existing Condition – Phrase used in the Stormwater Master Plan (SWMP) as a reference to the land characteristics and habitat condition prior to manmade modifications.

Preserve – Save from change or loss and reserve for a special purpose; the most strict non-degradation standard.

Pretreatment – Treatment of urban runoff prior to discharging into a public water body.

Properly Functioning Condition (PFC) – The National Marine Fisheries Service defines PFC as the sustained presence of natural habitat-forming processes that are necessary for the long-term survival of a species through the full range of environmental conditions.

Protect – Save or shield from loss, destruction, or injury or to save for future intended use. After "preserve," the next most strict non-degradation standard.

Redevelopment – Restoration or replacement of existing buildings.

Restoration – Process of returning an area to a close approximation of a former condition, and re-establishing functions.

Riparian – Land adjacent to a water body that directly affects or is affected by the aquatic environment. This includes streams, rivers, and lakes and their side channels, floodplains, and wetlands, and portions of adjacent slopes that shade the channel or provide streamside habitat. The area of transition from an aquatic ecosystem to a terrestrial system. (Note: This definition should replace the definition found in Article 50 of the Comprehensive Plan.)

Shall – Expressing what is mandatory.

Should – Expressing what is desired, but not mandatory.

Significant – A feature specifically identified as worthy of special recognition or protection (e.g., a "significant" wetland), or a resource that has been formally adopted by the City.

Stormwater – Rainfall or snowmelt that drains into public streams or pipes.

Stormwater Functions – Includes sustaining aquatic habitats, cleansing, nutrient transfer, and other beneficial functions.

Stormwater Phase II Rules – Federal Clean Water Act regulations that deal with runoff water quality issues, including pollutants and construction sediments. (See Appendix H for a summary of the Rules.)

Stream Corridor – Corridor of land of variable width along each side of a stream channel that is primarily reserved for stormwater-related and other stream system functions and processes.

Stream Corridor Functions – The attributes (uses and processes) connected with a stream corridor. These include ecological functions such as filtering pollutants, shading the channel, managing floodwater, supplying food for fish (insects, leaves, etc.) and other aquatic life, providing space for channel movement, and providing large wood to the channel when trees die.

Stream System – The channel, subsurface flow, and adjacent corridor, including the floodplain.

Sustainable – Able to be maintained or continued indefinitely.

Undeveloped Land in the Floodplain – Either (1) land that does not contain a primary structure or (2) in cases where land does contain a primary structure, then land that can be divided and the resulting vacant parcels can be developed per the Land Development Code.

Unwanted Species – Species that are either non-native or that do not contribute to the properly functioning condition of an adjacent stream.

Upland Natural Resources – Natural features and areas outside of the stream corridor and the 100-year floodplain that influence stormwater function and management. They include uplands, wetlands, vegetation, swales, and groundwater zones.

Urban Fringe – Area within the Urban Growth Boundary and outside the city limits.

Urban Growth Boundary – A line that circumscribes the urban fringe and the city limits and that is intended by state and local regulations to contain the area available to urban development.

Urban Stream – Seasonally or perennially surface-flowing watercourse with a defined channel, including watercourses in either a native or altered form.

Watershed – Drainage area of a specific stream system. Small watersheds are components of larger watersheds.

TABLE OF CONTENTS

LIST OF FIGURES

(an * indicates figure follows page listed)

LIST OF FIGURES

(an * indicates figure follows page listed)

LIST OF TABLES

EXECUTIVE SUMMARY

The City of Corvallis (City) worked with a 13-member Stormwater Planning Committee (SWPC) to develop the *City of Corvallis Stormwater Master Plan* (SWMP). The committee members were appointed by the Mayor and met over a 5-year period to support preparation of the plan. The SWMP makes recommendations to improve water quality, address existing and future flooding problems, and protect or enhance natural systems, including riparian, stream, and floodplain functions. It is intended to guide upgrades and expansion of the stormwater conveyance system and to guide stormwater management within the City over the next 20 years.

The recommendations will affect the City's capital improvement and operating programs. Stormwater utility rates and system development charges will need to be updated to finance the recommendations of the SWMP. Other recommendations include new City policy and development standards that will affect the way future development manages stormwater and the associated natural resources.

The SWMP's study area is defined by the natural drainage basins or watersheds that constitute the area's drainage system. The study area crosses City boundaries and extends into, and in some locations, beyond, the current Urban Growth Boundary, which represents the potential future boundary of the City, as shown in Figure ES-1. Recommended improvements for areas outside the current city limits will not be implemented until those areas are incorporated into the City or until a cooperative agreement is reached with Benton County.

The City and the technical consultant team worked closely with citizens, the SWPC, Benton County, and relevant regulatory agencies to develop the SWMP. Implementation of the SWMP will require active involvement of property owners, all City departments, state and federal agencies, and local stakeholders.

PUBLIC INVOLVEMENT

Implementation of the SWMP requires community support to be successful. A comprehensive public involvement program was included in the planning process to ensure that the SWMP addressed community values and concerns. The public involvement program included the following elements:

> An **SWPC** to provide ongoing review, guidance, and liaison with the community. SWPC members were appointed by the Mayor to represent a broad range of community interests. They played an integral role in each aspect of the planning process.
>
> **Interviews with community leaders and key stakeholders** to establish a baseline of public opinion and identify public sentiment toward the management of stormwater in the City. Fifty stakeholders representing a wide spectrum of the community participated in the survey, including landowners, business owners, residents, neighborhood and community organizations, local government representatives, state government representatives, Oregon State University representatives, Planning Commissioners, and City Councilors.

Public telephone surveys to solicit input from local residents.

Public workshops to solicit community input into the planning process, including two general meetings to identify public values, one meeting to finalize evaluation criteria, and two follow-up meetings to present stormwater recommendations to the public.

Workshops/meetings held for each group of watersheds to solicit input from local residents regarding problems, concerns, and their visions for the future. The workshops and meetings also served as a way to share with local residents the preliminary results of the modeling and alternatives development tasks. The eight watersheds were divided into three groups to facilitate meeting preparation and execution.

OBJECTIVES

Objectives were identified to guide the stormwater planning process based on seven categories of issues identified by the SWPC and the City. The issues to be addressed by the SWMP include:

- Stormwater quality
- Stormwater quantity
- Uplands and wetlands natural resources
- Floodplain
- Stream system
- Public participation and information outreach
- Cross-jurisdictional stormwater management

In addition, City policies were developed to support the objectives identified for each of the issues.

THE PLANNING PROCESS

The development of the SWMP involved a number of activities spanning multiple disciplines. The following activities were performed:

Description of planning area characteristics including topography, geology and soils, vegetation, climate, rainfall statistics, and land use. These factors play an important role in determining the quantity and quality of stormwater discharges.

Stream channel assessments of selected stream reaches to determine existing channel and bank conditions.